

What is claimed is:

1. An illumination optical system, comprising:

a light source which irradiates illumination light on a  
5 spatial light modulator; and

an optical integrator which is placed between the light source and the spatial light modulator and uniformizes an intensity distribution of the illumination light by passing light through optical elements,

10 wherein diagonal lengths of the optical elements of the optical integrator are 4 mm or less.

2. The illumination optical system of claim 1, wherein Etendue of the light source is not more than  $1\text{mm}^2 \cdot \text{str}$  (steradian).

3. The illumination optical system of claim 1, wherein  
15 the light source comprises a laser and an optical fiber for propagating laser light emitted from the laser therethrough and emitting the laser light.

4. The illumination optical system of claim 3, wherein the light source has a constitution in which multiplexing of  
20 a plurality of lasers is performed by making the lasers incident on one optical fiber and a plurality of the optical fibers are further arranged to form a bundle.

5. The illumination optical system of claim 1, wherein the spatial light modulator is a DMD.

25 6. The illumination optical system of claim 2, wherein the spatial light modulator is a DMD.

7. The illumination optical system of claim 3, wherein the spatial light modulator is a DMD.

8. The illumination optical system of claim 4, wherein the spatial light modulator is a DMD.

5        9. An exposure device having a constitution in which illumination light emitted from the illumination optical system of claim 1 is modulated by the spatial light modulator based on a predetermined image signal and exposure of a photosensitive material is performed with an image formed by this modulated  
10 illumination light.

10. An exposure device having a constitution in which illumination light emitted from the illumination optical system of claim 2 is modulated by the spatial light modulator based on a predetermined image signal and exposure of a photosensitive  
15 material is performed with an image formed by this modulated illumination light.

11. An exposure device having a constitution in which illumination light emitted from the illumination optical system of claim 3 is modulated by the spatial light modulator based  
20 on a predetermined image signal and exposure of a photosensitive material is performed with an image formed by this modulated illumination light.

12. An exposure device having a constitution in which illumination light emitted from the illumination optical system  
25 of claim 4 is modulated by the spatial light modulator based on a predetermined image signal and exposure of a photosensitive

material is performed with an image formed by this modulated illumination light.

13. An exposure device having a constitution in which illumination light emitted from the illumination optical system of claim 5 is modulated by the spatial light modulator based on a predetermined image signal and exposure of a photosensitive material is performed with an image formed by this modulated illumination light.

14. An exposure device having a constitution in which illumination light emitted from the illumination optical system of claim 6 is modulated by the spatial light modulator based on a predetermined image signal and exposure of a photosensitive material is performed with an image formed by this modulated illumination light.

15. An exposure device having a constitution in which illumination light emitted from the illumination optical system of claim 7 is modulated by the spatial light modulator based on a predetermined image signal and exposure of a photosensitive material is performed with an image formed by this modulated illumination light.

16. An exposure device having a constitution in which illumination light emitted from the illumination optical system of claim 8 is modulated by the spatial light modulator based on a predetermined image signal and exposure of a photosensitive material is performed with an image formed by this modulated illumination light.

17. An exposure method comprising the steps of:

modulating illumination light emitted by the illumination optical system defined in claim 1 with the spatial light modulator based on a predetermined image signal; and

5 exposing a photosensitive material with an image formed by this modulated illumination light.

18. An exposure method comprising the steps of:

modulating illumination light emitted by the illumination optical system defined in claim 3 with the spatial light modulator based on a predetermined image signal; and

10 exposing a photosensitive material with an image formed by this modulated illumination light.

19. An exposure method comprising the steps of:

modulating illumination light emitted by the illumination optical system defined in claim 4 with the spatial light modulator based on a predetermined image signal; and

15 exposing a photosensitive material with an image formed by this modulated illumination light.

20. An exposure method comprising the steps of:

20 modulating illumination light emitted by the illumination optical system defined in claim 5 with the spatial light modulator based on a predetermined image signal; and

exposing a photosensitive material with an image formed by this modulated illumination light.

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